METAL AND METAL COMPOUND REPORTING

SECTION 313 METALS

- Certain metals and metal compounds are Section 313 chemicals
  - Examples:
    - » Elemental metals: chromium, nickel, manganese, cobalt, silver, arsenic, copper
    - » Metal compound categories: zinc compounds, selenium compounds, nickel compounds, chromium compounds, vanadium compounds
    - » Individually listed metal compounds: sodium fluoroacetate , calcium cyanamide, lithium carbonate, molybdenum trioxide , titanium tetrachloride

SECTION 313 METALS WITH QUALIFIERS

- Metals and metal compounds can have qualifiers:
  - Zinc (fume or dust)
  - Aluminum (fume or dust)
  - Vanadium (except when contained in an alloy)
    - » Beginning RY 2000, reports due by July 1, 2001
  - Aluminum oxide (fibrous forms)
- All compounds within a metal category are reportable unless specifically excluded
  - Barium sulfate
  - Certain copper phthalocyanine compounds

SECTION 313 METAL COMPOUND CATEGORIES

- Consider the entire weight of the compounds in the category when determining activity thresholds
- Include only the weight of the parent metal of the category (e.g., copper for copper compounds) when calculating releases, off-site transfers, and other waste management activities

SECTION 313 METALS AND COMPOUND CATEGORIES

- Elemental metals and metal compound categories are separately listed chemicals under Section 313
  - Separate activity threshold determinations
  - Report for each listing (e.g., nickel or nickel compound category) only if the threshold for each listing is exceeded
  - If threshold exceeded for both the elemental metal and metal compound category (e.g., nickel and nickel compounds), you have options to report separately or file one combined report
    - » If combined, file as metal compound category

DETERMINING THRESHOLDS FOR METAL COMPOUNDS

Multiple compounds within a mixture example

A facility processes 200,000 pounds of a mixture containing 10% zinc chromate and 15% chromium dioxide by weight

- Quantity toward chromium compounds threshold

  (10% + 15%) x (200,000) = 50,000 lbs.
- Quantity toward zinc compounds threshold

  (10%) x (200,000) = 20,000 lbs.
- 25,000-pound processing threshold applies; chromium compounds are reportable and zinc compounds are not

METAL CYANIDE COMPOUNDS

- A metal cyanide compound such as cadmium cyanide will require separate reporting under both cadmium and cyanide*
  - For reporting the metal, use the entire weight of the compound for threshold determinations, and only the weight of the metal portion of the compound for release and other waste management reporting.
  - For reporting cyanide, use the weight of the entire compound for threshold determinations, and also the weight of the entire compound for release and other waste management reporting.

* *The qualifier for cyanide compounds states: $X^{+}CN^{-}$, where $X=H^{+}$ or any other group where a formal dissociation may occur. For example, KCN or $Ca(CN)_2$*

VANADIUM AND VANADIUM COMPOUNDS

- PBT rule modifies the listing for vanadium:
  - Vanadium, with the qualifier "fume or dust," has been on the list of Section 313 chemicals since 1987
  - Qualifier now reads "except when contained in an alloy"
    - » "Alloy" does not include slags, crystalline structures, ores
    - » EPA is reviewing what actions to take regarding alloys
- PBT rule adds vanadium compounds to the TRI list
- Neither vanadium (except when in an alloy) or vanadium compounds are PBT chemicals

VANADIUM

- Vanadium is used to produce various alloys
  - Prior to becoming part of the alloy, vanadium is a listed chemical
  - Once part of the alloy, vanadium is not a listed chemical
  - However, if vanadium is removed from the alloy, it is reportable

VANADIUM COMPOUNDS

- Manufacturing
  - Fuel combustion - metal oxides manufactured
  - Concentrations of listed metals are in the EPA's *TRI Guidance for Electricity Generating Facilities* (U.S. EPA, Office of Pollution Prevention and Toxics, February 2000)
  - Vanadium compounds are new to the list!
    - » 9 - 43 ppm V in coal (Ref. 2)
    - » 1.5 ppm V in fuel oil #2 (Ref. 3)
    - » 73 ppm V in fuel oil #6 (Ref. 3)
    - » 0.0023 lbs. per million standard cubic feet natural gas (Ref. 1)
    - » Assume V_2O_3 manufactured

VANADIUM AND VANADIUM COMPOUNDS REFERENCES

- For more information on vanadium see:

1. *Compilation of Air Pollutant Emission Factors (AP-42),* Volume 1, Fifth Edition. U.S. EPA, Office of Air Quality Planning and Standards. Available at http://www.epa.gov/ttn/chief/ap42/index.html
2. Hilliard, H. *The Materials Flow of Vanadium in the United States,* U.S. Department of the Interior, Bureau of Mines, Information circular 9409; 1994. Available at http://minerals.usgs.gov/minerals/pubs/commodity/vanadium
3. *Total Petroleum Hydrocarbon (TPH) Criteria Working Group* Association for the Environmental Health of Soils, Volume 2, Appendix 1; 1998. Available at http://www.aehs.com/publications/catalog/tph.htm

MANUFACTURING ACTIVITIES

- Manufacturing
  - Electroplating: metals and metal compounds manufactured
  - Fume or dust: machining manufactures zinc (fume or dust)
  - Importing copper ore: manufacturing copper compounds
  - Beneficiation of ore: chemical reactions manufacture metals and metal compounds
  - Wastewater treatment: metal compounds may be manufactured in reduction or precipitation steps

PROCESSING ACTIVITIES

- **Processing**
  - Metals and metal compounds extracted from ores distributed into commerce
  - Metals are incorporated into a wide variety of products including motor vehicles, consumer products, industrial equipment, and various other products
  - Alloys are mixtures of elemental metals. Metals in alloy products distributed into commerce
  - Metals sent off-site for recycling or reuse

OTHERWISE USE ACTIVITIES

- **Otherwise using**
  - Fabricating and/or using tooling
  - Installation of process-related equipment and piping (e.g., constructing storage tanks)
  - Use of ash and waste rock for land contouring, structural backfill, or soil building
  - Metal compounds are often constituents of coolants, biocides, and other liquid mixtures used on-site

DETERMINING THRESHOLDS AT MINES

- **Mines**
  - Use ore analyses, literature, geochemical knowledge, etc.
  - No knowledge of metal compound type - assume lowest weight oxide

DETERMINING THRESHOLDS FOR ALLOYS

- **Industrial processing of alloys**
  - Includes stainless steels, nickel superalloys, brasses, aluminum alloys, and carbon steels
  - Use alloy specifications in addition to MSDSs to improve precision
  - Be comprehensive:
    - » Some carbon steels and aluminum alloys may contain manganese above *de minimis*

ARTICLES EXEMPTION TEST

- Articles exemption is often inappropriately used!
  - A useful rule of thumb is that when metal is melted, machined, or ground, articles exemption usually NOT applicable
  - The manufacturer of an article does not qualify

STRUCTURAL COMPONENT EXEMPTION TEST

- Structural components need to pass a test to be exempt. Test has 2 criteria:
  - Is part of the facility structure; and
  - Is NOT process related
- Non-process-related structural items eligible for the exemption:
  - Potable water pipes and other non-process-related pipes and structures
- Processed-related items/uses NOT eligible for the exemption:
  - Refractory brick, process-related pipes, anodes used in electroplating, grinding wheels, and metal working tools

FORM R: AIR EMISSIONS

- Fugitive air emissions (Section 5.1)
  - Ambient air monitoring can indicate emissions occurring
  - Particulate emission data combined with speciation can be used to estimate emissions
  - Capture efficiencies of control equipment can be helpful
- Stack air emissions (Section 5.2)
  - Many techniques available:
    - » Use of sampling data, adjusting permit estimates to actual production, back-calculation from control device efficiencies and quantity of dust collected, and engineering estimates
  - Emissions factors available from AP-42 and WATER9

FORM R: WASTEWATER DISCHARGES

- Wastewater discharges (Sections 5.3, 6.1, and 6.2)
  - Calculate based on wastewater flows and measured concentrations (e.g., NPDES/SPDES monitoring requirements, permit applications)
  - For metals not measured, consider engineering estimate (e.g., use ratio of metals in process and measured metal quantity)

FORM R: OFF-SITE WASTE TRANSFERS

- It's critical to be comprehensive!
- Potential off-site waste transfers of reportable metals
  - Hazardous waste
  - Non-hazardous waste (e.g., waste oil and coolant)
  - Trash
  - Scrap metal (reuse vs. recycle)
- Exercise caution when using TCLP data

WASTE MANAGEMENT OF METALS

- Generally, metals cannot be treated or combusted for energy recovery for Sections 6 and 8 of Part II of the Form R
  - Metals are elements and cannot be destroyed
  - Exceptions include conversions to non-listed chemicals
    - » Examples:
      - – Barium chloride (included in barium compounds category) converted to barium sulfate (not included)
      - – Molybdenum trioxide converted to molybdenum carbonate
      - – Titanium tetrachloride converted to titanium dioxide

WASTE MANAGEMENT OF METALS

- For metals in wastes sent off-site for solidification/ stabilization
  - Use code M41 - Solidification/Stabilization-Metals and Metal Compounds only
  - Do NOT use code M40 - Solidification/Stabilization
- For metals in wastewater sent off-site for treatment (not to a POTW)
  - Use code M62 - Wastewater Treatment (Excluding POTW)- Metals and Metal Compounds only
  - Do NOT use code M61 - Wastewater Treatment (Excluding POTW)

OFF-SITE RECYCLE OR REUSE?

- Metal sent off-site for direct reuse:
  - No contaminants removed
  - Considered processing
  - *De minimis* exemption applies
  - Not reported on Form R

OFF-SITE RECYCLE OR REUSE?

- Materials sent off-site for recycling:
  - Considered processing
  - *De minimis* exemption does NOT apply
  - Report on Form R in Sections 6.2 and 8.5

FORM R: SECTION 7A, ON-SITE WASTE TREATMENT

- Part II, Section 7A: On-site waste treatment methods and efficiency
  - Report any waste treatment step through which a reportable chemical passes including removal
- Air pollution control equipment and wastewater treatment typically reported

FORM R: SECTION 8

- Consistency with data reported on other parts of Form R is critical
  - Quantity Released: §8.1 = §5 + §6.2 (disposal codes only) + §6.1 (metals and metal compounds only) - §8.8 (release or off-site disposal only)
  - Off-Site Recycling: §8.5 = §6.2 (recycling codes only) - §8.8 (off-site recycling)
  - On-Site & Off-Site Energy Recovery: §8.2 = NA and §8.3 = NA
  - On-Site & Off-Site Waste Treatment: §8.6 = NA and §8.7 = NA
    - » Remember exceptions when treatment of metals can occur!